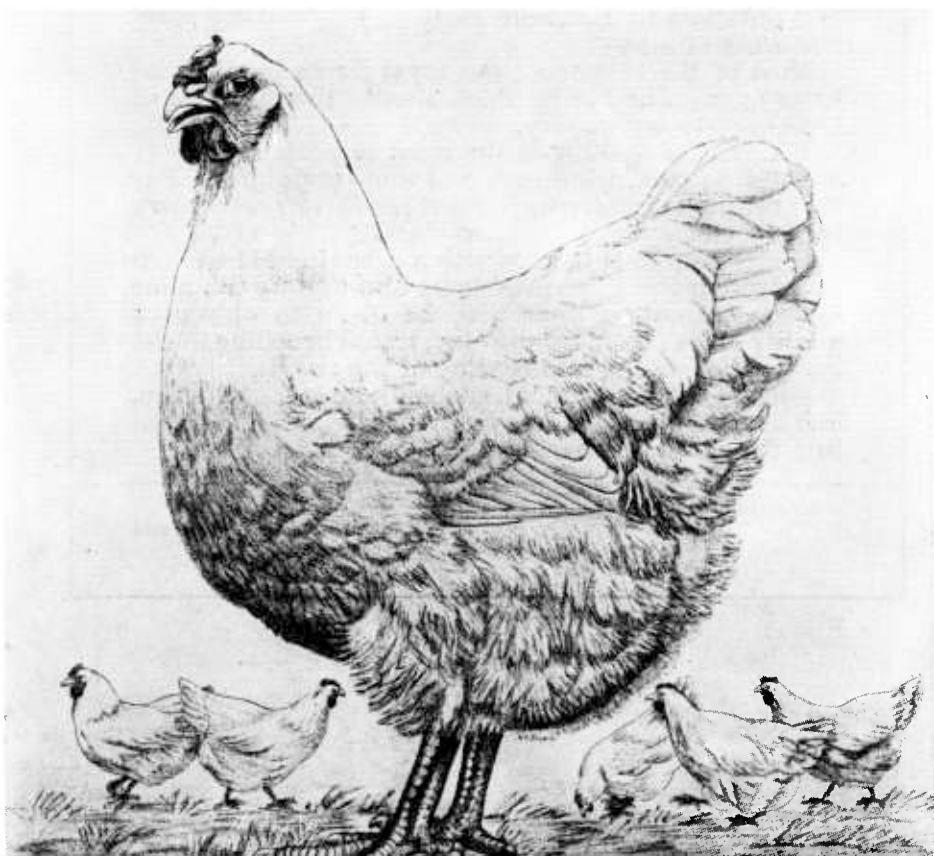


Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

1
Ag 84 F
copy 3

FARM POULTRY RAISING



Farmers' Bulletin No. 1524
U. S. DEPARTMENT OF AGRICULTURE

PROFITS in farm poultry raising are largely affected by the number of eggs produced during the fall and early months of winter and by the number of broilers and roasters that can be marketed when prices are highest. The larger profits can be best obtained by hatching early and by having early maturing strains.

Most of the revenue from farm flocks is obtained from eggs. The laying stock should therefore be of high bred-to-lay quality.

The cost of feeding is the most important item of expense in producing eggs and market poultry. For that reason it is very important for farm poultrymen to feed efficiently.

To keep up the egg production care should be taken in selecting the good producers and culling the poor layers. Attention must also be given to obtaining quality chicks from bred-to-lay, tested breeding flocks and to the feeding and rearing of the chicks.

Factors of management, such as housing, sanitation, and keeping the flock free from disease, are important in getting best results.

Washington, D. C.

Issued April 1927

Revised October 1948

FARM POULTRY RAISING

By H. R. BIRD, *poultry husbandman in charge of Poultry Investigations* and
A. R. LEE, *poultry husbandman, Animal Husbandry Division, Bureau of
Animal Industry, Agricultural Research Administration*¹

Contents

	Page		Page
Economic position of farm poultry.....	1	Feeding chicks.....	14
Efficient marketing influences.....		Feeding laying stock.....	15
profits.....	3	Feeding market poultry.....	17
Size of flock important.....	3	Storage and handling of feeds.....	18
Breeds and breeding.....	3	Dietary deficiencies.....	18
Classes and standard weights.....	4	Caponizing.....	18
Breeding for egg production.....	6	Artificial lighting.....	19
Selection of female breeders.....	7	Culling the laying flock.....	19
Selection of male breeders.....	8	Breaking up broody hens.....	22
Producing hatching eggs.....	8	Housing the laying flock.....	23
Factors influencing fertility.....	8	Preparing eggs for market.....	25
Factors influencing hatchability.....	9	Preparing poultry for market.....	26
Incubation.....	9	Sanitation.....	28
Buying day-old chicks.....	10	Disinfectants.....	28
Brooding.....	10	Predatory pests.....	29
Rearing.....	12		

ECONOMIC POSITION OF FARM POULTRY

A GOOD FARM FLOCK is not only an important factor in the production of staple food products, but also in increasing the revenue from the farm. Most farmers now appreciate the fact that a well-kept flock pays as well relatively, as most other branches of farming, and as a result interest in farm poultry raising has become widespread.

Surveys conducted during recent years in a number of farm poultry raising sections have shown that the larger portion of the poultry income is obtained from eggs. This is true even in the corn and wheat sections of the United States, although the proportion of the revenue obtained from eggs in those sections is not so high as in the Atlantic coast and the Pacific coast sections. This situation indicates that egg production is relatively more important than poultry-meat production, and that special attention should, therefore, be given to the improvement of the laying ability of farm flocks.

During recent years, however, so much attention has been given to the question of breeding for egg production that the best interests of the poultry-meat industry may have been sacrificed, at least to some extent. However important may be the matter of developing heavy-laying strains, there will always be a large proportion of chickens not used for laying or breeding

¹ This is a revision of and supersedes former editions by M. A. Jull, who resigned in August 1936.

purposes, and it is necessary to develop efficient means for preparing these chickens for market. In order to accomplish this the young stock must grow well during the spring and summer months, and be marketed as soon as it can be disposed of to good advantage.

The revenue to be obtained from the farm flock depends on success in breeding, feeding, and management. A proper combination of these factors makes for efficiency, and efficiency makes for success. Good breeding practices are necessary for success; for no amount of good feeding and proper management will make poorly bred hens lay many eggs. Good feeding, however, is of great importance, for it is only through good feeding that a well-bred flock can respond efficiently. Lastly, proper management, which includes incubating, rearing, housing, and sanitation, is essential in obtaining maximum results from a well-bred and well-fed flock.

When laying hens are fed all the mash and grain they will consume, as is the case at most commercial poultry plants, it is found that average Leghorn hens and those of similar breeds consume from 75 to 90 pounds of mash and grain per year, whereas the Plymouth Rocks, Rhode Island Reds, Wyandottes, and similar breeds consume from 85 to 100 pounds of mash and grain per year depending on egg production. In addition, both the smaller and the heavier breeds consume from 2 to 3 pounds of oyster shell and about 1 pound of grit per bird. On the average farm, however, some green feed and grain are obtained from the fields, and thus the cost of production is reduced somewhat.

This green feed and waste grain, as well as insects and other feed, are found by the chickens in the fields and about the yards during the spring and summer months; but, in most parts of the country the chickens do not have access to range during the late fall and winter months. The feeding of laying stock during this time is vitally important, because the profits to be made in poultry raising depend to a great extent on the number of eggs produced during the fall and winter months.

The worth of any hen as a layer is determined not only by the total number of eggs she produces but also by the time of production. Eggs laid in November are worth approximately 50 percent more than eggs laid in April or May. In the United States, the average farm production per layer during the year is about 150 eggs. These are laid principally from March to June, the season of lowest prices, and consequently the season of relatively lower profits.

There is room for considerable improvement in increasing the production of farm flocks. A study of the trend in the average monthly farm prices shows that lowest farm-egg prices prevail in April and that there is a slight increase in June, with a more perceptible increase beginning in July. The highest price is reached in November, with corresponding profits, provided egg production is good. Moreover, if there is good egg production during the fall and winter, the average price per dozen for the year is increased.

If the average Leghorn laying hen in a commercial poultry plant consumes from 75 to 90 pounds of feed in a year, it is a simple matter to determine the number of eggs, according to their price, required to pay for the feed consumed. Likewise, in the case of the heavier breeds, such as the Plymouth Rock and Rhode Island Red, if the average bird in a commercial poultry plant consumes from 85 to 100 pounds of feed a year, it is not difficult to ascertain the number of eggs it must produce to pay for its feed. The important point for farmers to realize is that it takes fewer eggs from October to January to pay for a given quantity of feed than during any other period of the year. Therefore, the greater the egg production during the fall and winter the

greater are the profits. What farmers should realize above all else is that, although they cannot control the price of grain or the price of eggs from season to season, they can control production, at least to a considerable extent.

EFFICIENT MARKETING INFLUENCES PROFITS

Efficient methods of production alone do not necessarily bring the highest net returns from a farm flock, because methods of marketing may be wasteful. Before a farmer can hope to realize the greatest profits from a farm flock he must be able to market his eggs and poultry to the best advantage. This brings up the matter of the most profitable number of birds for a farmer to keep. Although the exact number is a matter for him to decide, nevertheless a flock of 200 to 400 is particularly desirable in order that the management of the flock and the marketing of the eggs may be put on the most economical basis.

Too many farmers fail to realize that one reason why they do not receive a higher average price per dozen for their eggs is that their eggs are not graded. When small and poor quality eggs are marketed with the good ones the result is a lower price for all. If only a few eggs are obtained from a small flock, grading is less likely to be done than when the eggs are produced by a good-sized flock.

SIZE OF FLOCK IMPORTANT

Maintaining a farm flock of about 200 to 400 birds enables the farmer to divide his flock to advantage for breeding purposes. A flock of 200, for instance, can readily be divided into two units—50 yearlings and 150 pullets, and a flock of 400 into 100 yearlings and two units of 150 pullets each. Both pullets and yearlings are used for breeding purposes. Pullets lay more eggs and produce a much larger percentage of their eggs during the winter months. Yearling hens have gone through a molt the preceding fall, thus have had a rest prior to the breeding season. As compared to pullets, yearling hens lay larger eggs which hatch into bigger chicks. The yearlings saved should be only the best birds of the pullet flock of the preceding laying year, and the continuous selection from year to year should assist greatly in improving the quality of the pullets raised each year.

If a farmer is unable to keep a large flock of hens, there are advantages in limiting himself to a flock only large enough to supply his table with eggs and poultry meat throughout the year. This in itself is a considerable asset, and the cost of feeding such a flock is relatively small. On the other hand, the keeping of a flock of 200 or more has the advantage of making production and marketing more efficient. Also, the cost of labor per bird is reduced materially as well as the cost of housing and general cost of flock management. Every farmer, therefore, who has an outlet for hatching eggs or who can market eggs and poultry meat at good prices should plan to maintain a flock of 200 or more birds.

BREEDS AND BREEDING

A 5½-pound pullet laying 150 eggs in a year produces about three and one-half times her own body weight, and one laying 240 eggs produces about five and one-half times her own weight. For such hard work a hen must be vigorous and in the best of health. Vigor is indicated by a bright, full eye, bright-red comb and wattles, a well-developed body, and strong, well-placed legs.

On the other hand an undesirable bird may have a dull eye, narrow beak and head, an extremely long and narrow back, weak abdominal muscles, and sometimes weak legs. The constitutional vigor of a bird should be considered first in selecting it for the breeding or laying pen.

The Department of Agriculture frequently receives requests for literature on breeds and varieties that are suited to farm poultry raising conditions in various parts of the United States. There are many such breeds, but the strain or breeding of the birds is more important than the breed or variety to which they belong. There are, however, a few breeds and varieties, such as the New Hampshire, the Rhode Island Red, the Barred and White Plymouth Rock (fig. 1), and the Single-Comb White Leghorn, that are kept to a greater extent than all other breeds and varieties combined. The percentages of birds of these breeds in this country entered in the matings of the U. S. Record of Performance breeding stage of the National Poultry Improvement Plan for 1947 was as follows: White Leghorn 49, New Hampshire 16, White Plymouth Rock 12, Rhode Island Red 11, and Barred Plymouth

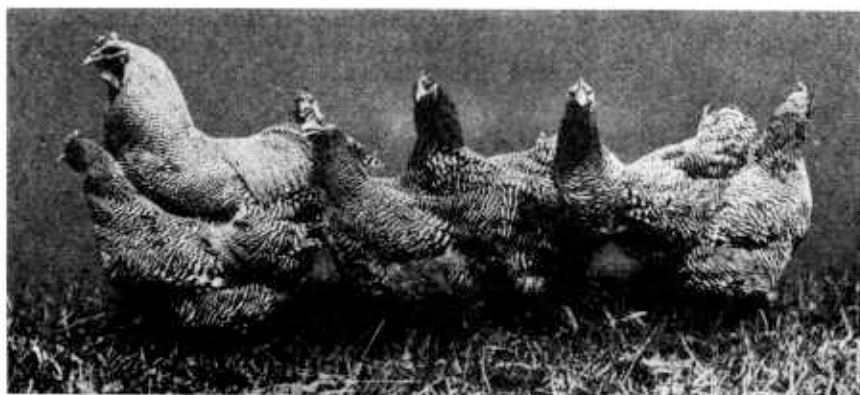


FIGURE 1.—Barred Plymouth Rocks are particularly well adapted for farm poultry raising. When properly bred they make good layers. They are of good size and have good fleshing properties and their yellow skin makes them popular as a table fowl.

Rock 9. This order is due not so much to the fact that these five varieties combine economic qualities superior to other varieties, but rather to the wide popularity they have gained and the fact that they have been bred for egg production to a greater extent than others.

CLASSES AND STANDARD WEIGHTS

The different breeds and varieties of chickens of interest to farmers are described in detail in Farmers' Bulletin 1506, *Standard Breeds and Varieties of Chickens*, under American, Asiatic, English, and Mediterranean Classes. All birds belonging to the American class, which includes such breeds as the Plymouth Rock, Rhode Island Red, and New Hampshire (figs. 1, 2, and 3), possess qualities that make them popular in the production of eggs and meat. Some of the less popular breeds are the Wyandotte (fig. 4) and the Jersey Black Giant, the latter being the largest breed and better adapted for meat



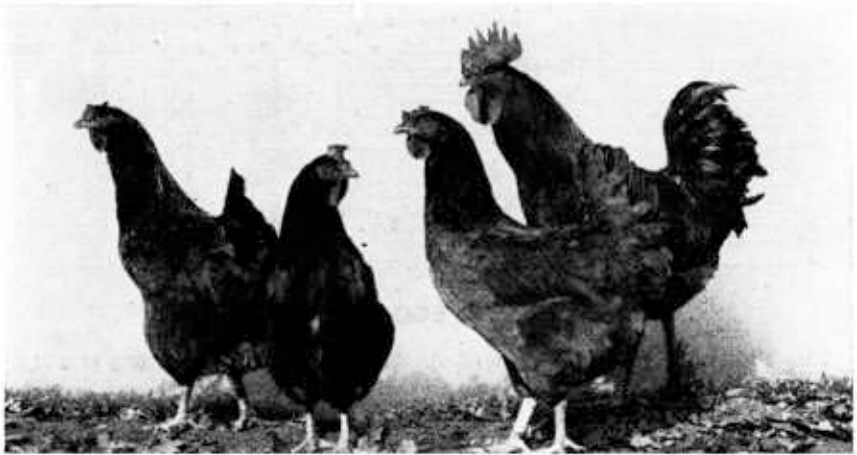
67573-B

FIGURE 2.—Rhode Island Reds are well suited for farm poultry raising. They are approximately 1 pound lighter than Plymouth Rocks, but possess the same good qualities as other dual-purpose chickens.

production than for egg production. Birds of these breeds are of good size and have good fleshing qualities. They are clean legged (that is, the shanks are free of feathering); the skin, beak, and shanks are yellow, except in the Jersey Black Giant, in which the skin is yellow and the beak and shanks are black; and all of them lay brown-shelled eggs.

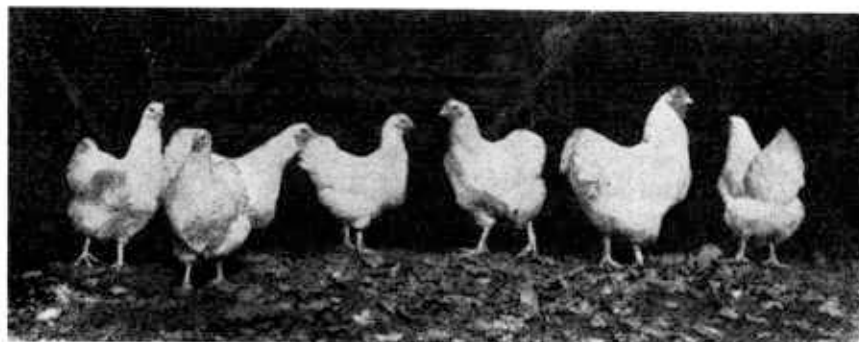
The Brahma is another large breed and belongs to the Asiatic class. It has feathered shanks, yellow skin, and lays brown-shelled eggs.

The birds belonging to the English class, which includes the Orpington, Cornish, and Sussex, show great diversity in character. All are of good size and have been noted for their excellent fleshing properties. The Orpington



11499-A

FIGURE 3.—The New Hampshire is a new breed, adapted both for egg and meat production, which is increasing rapidly in popularity. It is used extensively for broiler production.



68246-B

FIGURE 4.—The White Wyandotte is another American breed suitable for farm poultry raising. Like the Barred and White Plymouth Rocks and the Rhode Island Red, it has yellow skin, beak, and shanks, and lays brown-shelled eggs.

and Sussex have white skin, but the Cornish has yellow skin. All lay brown-shelled eggs.

The White Leghorn (fig. 16), the most popular breed for commercial egg production, belongs to the Mediterranean class, which includes the Ancona and Minorca. These breeds are much smaller than the American breeds and are not so desirable for meat production. They are clean legged; the Leghorn and Ancona are yellow-skinned; and the Minorca is white-skinned; all lay white-shelled eggs.

The standard weights of the principal breeds are given in table 1.

TABLE 1.—Standard weights of breeds and varieties mentioned in this bulletin

Breed	Variety	Standard weights			
		Cock	Hen	Cockerel	Pullet
		Pounds	Pounds	Pounds	Pounds
Plymouth Rock.....	All varieties.....	9½	7½	8	6
New Hampshire.....		8½	6½	7½	5½
Wyandotte.....	All varieties.....	8½	6½	7½	5½
Rhode Island Red.....		8½	6½	7½	5½
Jersey Black Giant.....		13	10	11	8
Brahma.....	Light.....	12	9½	10	8
Orpington.....	All varieties.....	10	8	8½	7
Cornish.....	Dark and White.....	10½	8	8½	6½
Sussex.....	Light.....	9	7	7½	6
Leghorn.....	All varieties.....	6	4½	5	4
Ancona.....		6	4½	5	4
Minorca.....	Single-Comb Black.....	9	7½	7½	6½

BREEDING FOR EGG PRODUCTION

The ability to lay eggs is inherited. To develop an egg-laying strain of chickens requires careful selection and the adoption of a consistent breeding policy. What is most needed is the development of winter layers. The average hen should not only lay at least 150 to 160 eggs in a year but most of them should be laid from October to March. Not only is this necessary for profitable production but from the standpoint of breeding it is highly desirable, because heavy winter laying pullets make the best breeders as yearlings.

SELECTION OF FEMALE BREEDERS

The selection of female breeders is a very important matter, because with a little care the farmer can soon improve the quality of his flock materially. Selecting pullets to be used as breeders in their second year is relatively simple, if one observes his birds closely. In the first place, females selected for breeding purposes should be standard bred. The more important disqualifications, such as side sprigs in single-comb varieties, stubs in clean-legged breeds, and "foreign" color markings, should not be tolerated. Birds with such characters should be marketed or at least removed from the breeding flocks.

In developing a laying strain five factors should be taken into consideration in observing pullets during the first laying year in order to select them properly for breeders the second year.

The first factor is that of earliness of maturity. When the pullets are put into the laying houses in the fall the time at which they begin to lay should be carefully noted. This can be determined by observing the relative development of the color of the comb and wattles as well as by the width of spread between the pubic bones. The pullets should be shut in their houses about once a week during the fall months when they are beginning to lay; then they can be caught, preferably in a catching coop, and handled readily. If they are in laying condition a cheap, colored, celluloid band should be put on one leg. Different-colored bands may be used for birds laying at different times of the year; as for instance, pink bands for birds that begin to lay in October and blue bands for those that begin in November.

The second factor to be observed in the selection of the laying hen is that of rate or intensity of production. In breeds whose beaks and shanks are normally yellow, as Plymouth Rock, Leghorn, and Rhode Island Red, the normal color of beaks and shanks in pullets that lay with the greatest intensity after they once begin, will usually bleach out more quickly than in pullets that lay only intermittently. Therefore, if the farmer observes his flock rather closely during the fall months, he can readily determine the birds that are laying at the heaviest rate and mark them with celluloid leg bands.

The third factor to be considered in the selection of pullets to be used as breeders in the second year is that of persistence of production in late summer and fall and the time and rate of molting. Laying pullets that molt early in their pullet laying year are usually poorer layers than the ones that molt late in the fall. Also, the early molter ceases egg production early in the summer or fall, whereas the late molter persists in laying well throughout that period and thus makes a good annual record. Differences in persistency of production among birds are also readily demonstrated by the appearance of the beaks and shanks.

The fourth factor is that of broodiness which, however, does not usually apply in the breeding of Leghorns. Broodiness is inherited, and sometimes is responsible for materially reducing egg production. In some strains it can be eliminated after a period of years of careful selection by observing the flock carefully during the spring months and marking, with colored bands, birds that go broody most frequently. This procedure is easily carried out, and will pay for any trouble taken in marking the most persistently broody hens.

The fifth factor to be considered is that of pauses in egg production. Birds out of production for a period of a week or longer are considered in

the pause group. Environmental conditions, broodiness, and winter pauses may put hens out of production for this period. Percent of production from date of first egg to March 1 is usually considered in this connection.

These simple methods of selecting female breeders will enable farmers to improve the egg-laying qualities of their flocks materially in a few years. The methods include selecting each year: (1) Those hens which mature early; (2) those which lay best; (3) those which lay well throughout the late summer and fall; (4) those which seldom go broody; and (5) those that do not have pauses in production in winter.

SELECTION OF MALE BREEDERS

The selection of male breeders is relatively more important than the selection of female breeders, because the offspring of each male are more numerous than the offspring of any female, and the male constitutes one-half of the heritage of all the offspring. Male breeders, like female breeders, should be selected on the basis of conforming reasonably well to the standard qualifications for the breed and variety. What was said concerning the selection of females on the basis of constitutional vigor also applies equally well in the selection of male breeders. A farmer may select good male breeders from his flock of cockerels each year by observing them closely and noting particularly those which possess the best type for breeding, have the greatest constitutional vigor, mature early, and have good handling qualities, such as fine texture of skin and good quality of bone. By carefully selecting such male breeders each year the production of the pullet flock each succeeding year should be increased steadily.

Further information on the culling of breeding and laying stock is contained in Farmers' Bulletin 1727, Selecting Hens for Egg Production.

PRODUCING HATCHING EGGS

The best criterion of success for the poultry raiser is the number of mature chickens reared in proportion to the number of eggs set. Good chicks cannot be obtained from poor eggs, and success in incubation depends to a large extent on the quality of hatching eggs produced.

FACTORS INFLUENCING FERTILITY

The general treatment given the hens affects the number of fertile eggs produced. Sanitation is essential. The fowls should be fed liberally on wholesome feed, kept in houses that are dry and provided with plenty of fresh air. It is especially important not to overcrowd the houses and to keep the litter clean and dry during the breeding season.

The factor of time between the placing of the male birds in the breeding pen and the saving of eggs for hatching must be considered. A fertile egg may be obtained 1 day after the time of mating a male to a female, but in the commercial production of fertile eggs about 2 weeks should elapse from the time the males are placed in the breeding pen before eggs are saved for hatching. The fertility of eggs remains at a sufficiently high percentage for about 5 days after the males are taken out of the breeding pen.

The number of fertile eggs produced depends on the number of matings during the breeding season, which, in turn, depends to a certain extent on the number of males mated to a given number of females. One male mated

to a varying number of females up to about 15 should result in a fairly consistent percentage of fertile eggs.

Fertility is not an inherited factor. The eggs of a hen may run very high in fertility, but those of her daughters may run extremely low.

FACTORS INFLUENCING HATCHABILITY

The vitality of the breeders has a marked influence on the hatching quality of the eggs; birds lacking in constitutional vigor are sure to produce eggs low in hatching quality.

The influence of breed on hatching quality is more marked between extremes of breed type; for example, the active Leghorn will average better than the more phlegmatic Brahma. Among breeds of the same type, such as Plymouth Rocks, Wyandottes, and Rhode Island Reds, there is no noticeable difference in regard to the hatching quality.

Pullets may produce eggs as good in hatching quality as those of hens, but care must be taken to select mature pullet breeders in order that the vitality of the chicks may not be impaired. Yearling hens usually lay larger eggs which hatch into larger and stronger chicks than those laid by pullets.

Although the number of eggs hatched naturally depends on the number of fertile eggs produced, there may be no correlation between fertility and hatching quality in the fertile eggs of any hen. In other words, a hen's eggs may run very low in fertility but practically all the eggs that are fertile may hatch, whereas another hen's eggs may run very high in fertility but very few of the fertile eggs may hatch.

The hatching quality of eggs is an inherited character. This applies to both the male and female lines. In general, the sooner the eggs are incubated after being laid the better. The hatchability remains fairly constant in eggs held for 7 to 10 days. Hatching eggs keep best in a temperature of from 50° to 55° F. The best place to keep hatching eggs is a cool- well-ventilated cellar, where they should be turned daily if they are held longer than 7 days.

INCUBATION

The fundamental object in incubation is to get the largest possible number of chicks in proportion to the number of eggs set. Inefficient management during incubation spoils hatching eggs of good quality that normally would hatch into good, strong chicks. Detailed information on the incubation of eggs is given in Farmers' Bulletin 1538, Incubation and Brooding of Chickens.

It is very important to have chicks hatched as early as possible. Above all they should not be hatched late in the season. Inasmuch as winter-egg production is the most profitable branch of the poultry industry, and the average well-bred, general-purpose chicken does not begin laying until about 5½ to 6½ months of age, hatching should be done so that the birds will start laying in September or October. Leghorns and similar breeds may be hatched later than heavier breeds. Most farmers would obtain greater returns from their flocks if the pullets were hatched early enough to begin laying in time for the high egg prices during the fall and early winter months.

The hatching capacity required for the reproduction of the flock from year to year depends on the size of the flock to be reproduced as well as on the number of chickens that may be hatched at one time. In the case of

the 200-bird flock, for instance, in which 150 pullets are to be placed in the laying houses each year, a flock of 350 chicks would have to be raised as practically one-half of the flock would be cockerels. Allowing for about 15 percent mortality during the rearing season, 350 chickens in the fall of the year would mean that, with about 70 percent hatch, approximately 700 eggs would have to be set to produce 420 chicks.

BUYING DAY-OLD CHICKS

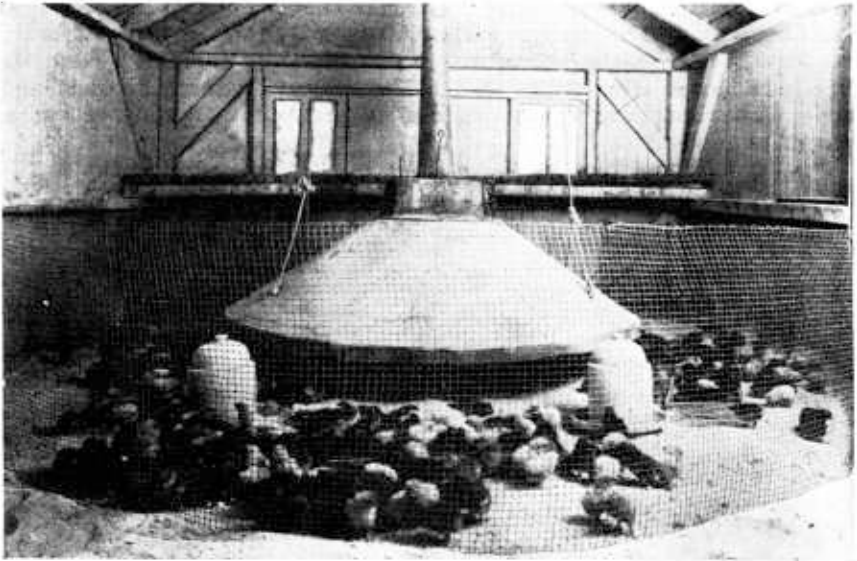
More and more farmers are buying day-old chicks instead of incubating eggs and it is estimated that more than 85 percent of all the chickens raised in farm flocks come from commercial hatcheries. In many hatcheries some of the chicks are separated at hatching time according to sex, the pullet chicks being raised for egg production and the cockerel chicks for meat production. These are referred to as "sexed" chicks. Day-old chicks of the highest quality are produced in hatcheries where the breeding flocks supplying the eggs are inspected carefully and culled rigidly and only the best birds in the flocks are used as breeders. The poultry plants where the breeding flocks are maintained should be kept in sanitary condition at all times. The eggs sent to the hatcheries should be of good size, as well as uniform in shape and shell color, and of good shell texture.

It is important that farmers who buy chicks from commercial hatcheries pay particular attention to the breeding and pullorum-disease control program back of the chicks. A large number of breeders and hatcheries throughout the country are participating in the National Poultry Improvement Plan, which has as its primary purpose the improvement of chicks with respect to production and freedom from pullorum disease. The plan is administered cooperatively by an official State agency in each of the cooperating States and the Bureau of Animal Industry of the United States Department of Agriculture. A list of breeders and hatcheries participating in the plan may be obtained from the State college of agriculture, the State Department of Agriculture, or from the United States Department of Agriculture, Washington 25, D. C.

BROODING

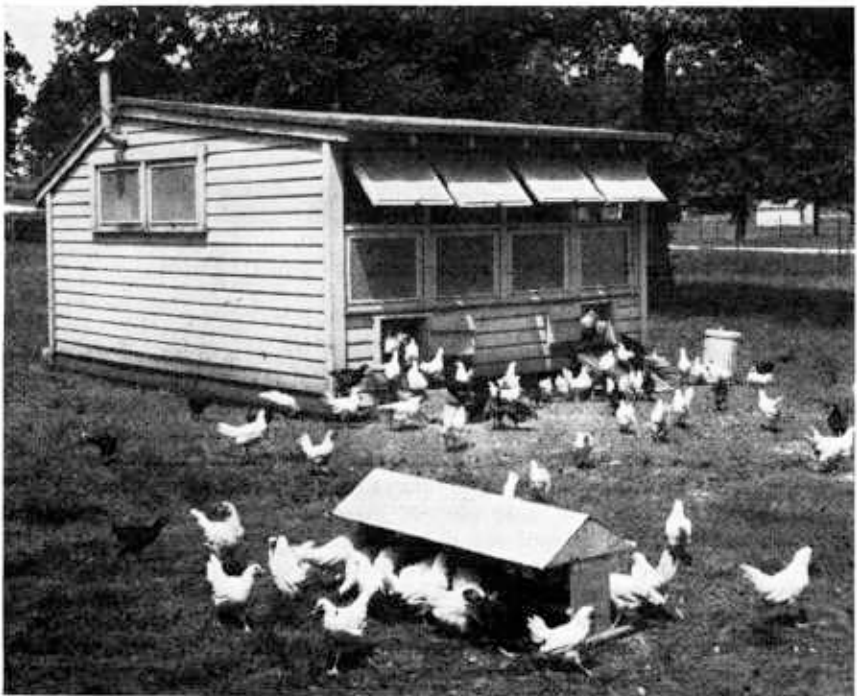
Chicks that are healthy and vigorous as they come from the incubator should make economical growth if they are carefully brooded. The most important factors in brooding are proper temperature, plenty of room, and proper sanitation. Chicks in large numbers, 150 or more, are now being raised artificially with success, particularly since the introduction of individual brooder stoves (fig. 5). Well-made, good-sized brooder stoves reduce the cost of brooding and lessen the labor. There are a number of good makes on the market, and in most cases they are simple to operate and give satisfaction. The smaller size brooders accommodate from 100 to 300 chicks each and the larger sizes from 300 to 500 or more. Each brooder is simply a small stove with a movable hover attached, arranged so that it can be raised or lowered according to the degree of heat required.

Yards and fences are necessary for brooding the chicks in order that the old stock may be kept off the range where the chicks run (fig. 6). This is vitally important; otherwise, the growing chicks are liable to become contaminated with intestinal worms, body lice, and other parasites. Farmers should have plenty of land to give their growing chicks abundance of free range without interfering materially with the other crops. Brooders are often placed



24386-B

FIGURE 5.—A coal-burning stove brooder is profitable equipment on many farms.



10798-A

FIGURE 6.—This colony brooding and rearing house has adjustable shutters to provide ventilation.

in houses that can be moved from one field to another; or they can be placed in different parts of the orchard each year (fig. 7). In this way the chicks are raised on fresh soil, are inclined to grow faster, and should keep relatively free from disease. Growing chicks require plenty of shade and freedom, and under those conditions, in addition to proper methods of feeding, growth is usually satisfactory.

Further information on this subject is contained in the United States Department of Agriculture Farmers' Bulletin 1538, Incubation and Brooding of Chickens.



13150-C

FIGURE 7.—Moving a colony house to a new location.

REARING

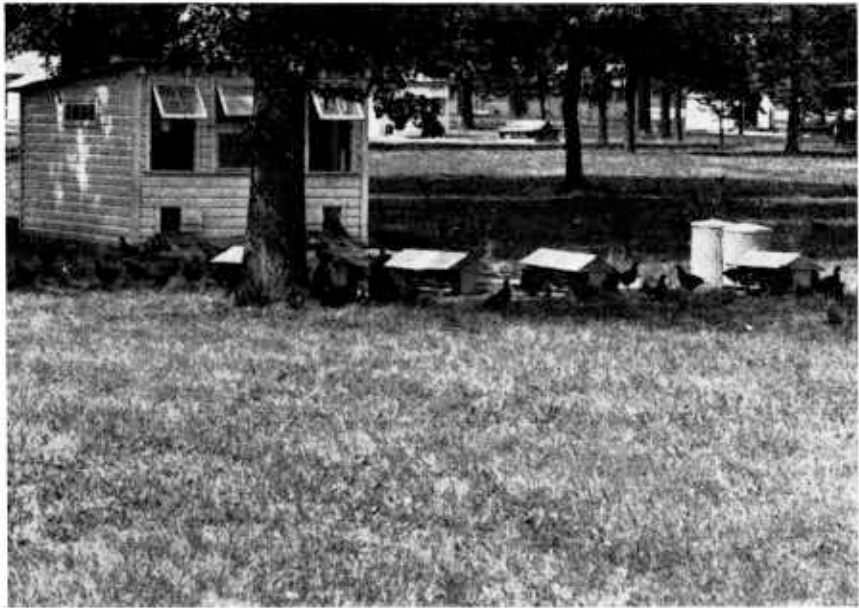
Great care must be taken from the time the chicks are weaned from the heat of the brooders until they are matured, to see that they develop properly. Faulty conditions may so retard growth as to affect the vitality and vigor of the stock. The chicks must be kept developing at a normal rate throughout the growing season. The houses in which chicks are brooded and reared should promote the most efficient growth, provide ample protection from the weather, and be well ventilated. At the same time a direct draft never should pass through the house. The main object should be to make the house as comfortable as possible at all times.

Chicks of different ages should not be raised together. The older ones will crowd the younger, and poorly developed chickens will result. Separation of the chicks according to sex is also necessary. The time for separating varies according to the breed. Cockerels of the lighter class, such as Leghorns, should be removed from the pullets when about 6 to 8 weeks old, and cockerels

of the general-purpose class, such as Plymouth Rocks, when about 8 to 10 weeks old.

The pullets intended for laying should be kept by themselves. They must be given proper treatment to insure good laying condition by September or October. Avoid disturbances to the flock.

The growth of the pullets to maturity should proceed without interruption, because checking of growth at any stage may retard laying at maturity. Influences unfavorable to the development of the body will also be unfavorable to the proper development of the reproductive organs, on which egg production depends. Free range on clean soil and plenty of green feed and shade are essential for good growth. (Fig. 8.)



67035-B

FIGURE 8.—Chickens should be raised in shady quarters on clean soil with plenty of green feed.

In the fall of the year the pullets are moved from summer to winter quarters. This is necessary because the pullets should be raised on free range and on different parts of the farm each succeeding year. They should be in their winter laying quarters before they start to lay. They will then have a good chance to settle down and become acquainted with their new quarters. The moving should be done as quietly as possible.

Great care should be taken to select only the best pullets for the laying pen. Do not place a diseased or a very thin pullet in the laying flock.

The cockerels reserved for breeding purposes should be kept separate from the pullets, but should have the same general treatment. Good growth and sound constitutions in breeding cockerels are essential to their successful rearing. The cockerels should be well developed and well matured before they are placed with the females for breeding purposes.

The chickens, usually cockerels, that are marketed at an early age (from 10 to 14 weeks) are usually called broilers. Since early maturity is highly desirable careful attention must be given to the broilers just before marketing, in order that plenty of meat may be produced. Cockerels to be sold as broilers are culled out of the chicken flocks at about 8 weeks of age, are kept separately, and may be fed on a special fattening ration. Otherwise they are treated much the same as other chickens.

The cockerels that are to be sold as roasters in the fall of the year, after separation from the pullets, should be kept on free range and allowed to grow as large frames as possible. Quick growth and good size are essential in raising good roasters.

FEEDING CHICKS

To obtain maximum growth with as few losses as possible, chicks must be fed properly. Feed and water should be provided as soon as the chicks are placed around the brooders and should be available to them at all times. To encourage them to begin eating, feed should be supplied not only in feeders but also on clean egg-case flats or other pieces of cardboard. These should be removed after the second day.

There is some advantage in giving finely cracked corn as the only feed during the first 2 days after hatching. This practice helps to prevent the development of sticky droppings and "pasting up" of the vent, although "pasting up" is usually evidence of improper brooding temperature. If the proper brooding temperature is uniformly maintained, chicks may be given starting mash from the beginning. If cracked corn is fed, it should be replaced by starting mash not later than the third day.

It is important to have enough feeding and drinking space. At first 2 inches of feeding space and one-half inch of drinking space per chick should be provided. As the chicks grow the feeding and drinking space must be increased.

After the first 3 days the chicks should receive no feed other than starting mash until they are 6 to 8 weeks old, except that fine grit may be mixed with the mash or supplied in separate hoppers. The starting mash, as well as other types of mash for poultry, may be bought as commercial formula feed or may be mixed on the farm but mixing feeds on the farm for the farm flock of average size is no longer economical unless home-grown grains make up the greater part of the mash. Even when using home-grown grains, it may be better to buy a manufactured concentrate to mix with the grains rather than to purchase individual ingredients for a home-mixed mash.

The following formula is suggested for a home-mixed starting mash:

Percent		Percent	
Ground yellow corn.....	25.0	Fish meal.....	2.0
Pulverized oats or ground wheat...	10.0	Meat meal.....	4.0
Ground corn, wheat, barley, or grain sorghum.....	20.4	Dried whey.....	5.0
Alfalfa leaf meal.....	5.0	Steamed bonemeal.....	1.0
Soybean meal.....	16.0	Ground limestone or oystershell..	1.0
Cottonseed meal, peanut meal, corn gluten meal, or soybean meal...	10.0	Manganized salt ¹5
		Vitamin A and D feeding oil ²1

¹ Prepared by mixing 100 pounds of dairy or table salt with 3 pounds of finely pulverized technical anhydrous manganous sulfate.

² Containing 400 A. O. A. C. (Association of Official Agricultural Chemists) units of vitamin D and 2,000 International Units of vitamin A per gram.

Pullets being raised for flock replacement should be separated from the cockerels as soon as the latter can be distinguished. The cockerels may continue to receive the starting mash or they may be fed a commercial broiler mash. In either case it is assumed that they will be sold as broilers at 10 to 14 weeks of age. It is common practice to feed some whole grain during the last few weeks before marketing but grain feeding should not be started until the cockerels are 8 weeks old. About 12 or 13 pounds of feed are required to bring a Rhode Island Red or Barred Rock cockerel to 3.5 pounds' weight.

Pullets may receive some grain in addition to the mash when they are 6 to 8 weeks old. The quantity of grain should be small at first and should be increased gradually until equal parts of mash and grain are being fed at 15 weeks of age. Grain should be fed in the mash hoppers or in separate hoppers. Satisfactory grain mixtures may be prepared by mixing equal parts of whole yellow corn and wheat; or yellow corn, wheat, and oats; or yellow corn, wheat, and barley.

When pullets are about 8 weeks old the starting mash may be replaced by a commercial or home-mixed growing mash. The following is a satisfactory growing mash formula:

	Percent		Percent
Ground yellow corn-----	25.0	Meat meal-----	5.0
Ground oats or wheat-----	10.0	Dried whey-----	6.0
Ground corn, wheat, barley, or grain sorghum-----	11.8	Steamed bonemeal-----	3.0
Alfalfa leaf meal-----	5.0	Ground limestone or oystershell---	2.0
Soybean meal-----	21.0	Manganized salt ¹ -----	1.0
Cottonseed meal, peanut meal, corn gluten meal, or soybean meal---	10.0	Vitamin A and D feeding oil ² -----	.2

¹ and ². See footnotes 1 and 2 on page 14.

This mash is adequate for chickens reared in partial or total confinement. However, pullets intended for flock replacement should have pasture composed of young actively growing grass and legumes whenever possible. If they have access to direct sunshine (not sunshine that passes through glass) and good pasture, the alfalfa leaf meal, dried whey, and vitamin A and D oil may be omitted from the mash, and the meat meal may be replaced by soybean meal. Shade is important to birds on range, and feed and water should be offered in shady locations.

About 1 month before pullets are expected to begin laying, the growing mash should be gradually replaced by laying mash. Mixtures of the two mashes may be fed during a period of 2 weeks while the change is being made. About 22 or 23 pounds of feed is required to rear a pullet to sexual maturity.

FEEDING LAYING STOCK

In order to get the greatest returns from the feed supplied, the laying stock must be of the highest quality from the standpoint of breeding. It is also important to obtain early hatched chicks and to grow them to maturity by the first of October. Pullets of good health and vitality should be the first consideration in building up a laying flock.

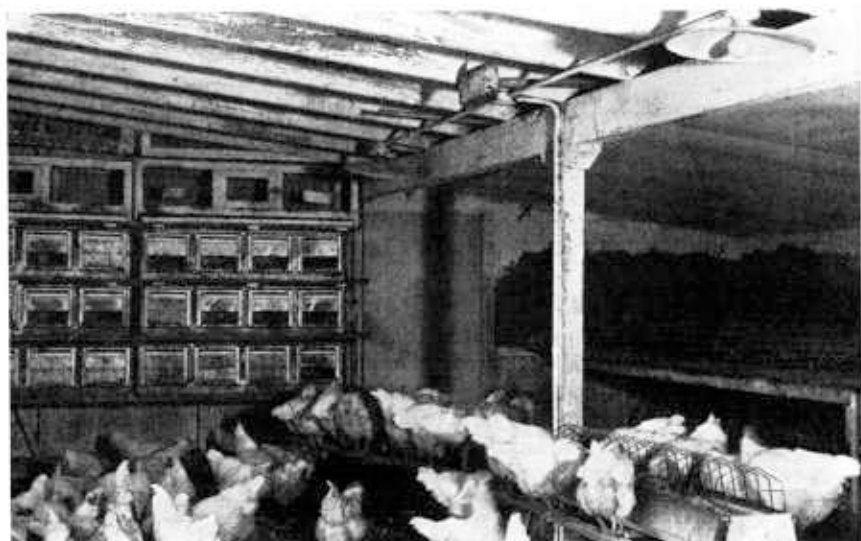
There are several different systems of feeding laying birds, but for the farm flock the diet should consist of mash, grain, crushed limestone or oyster

shell, grit, and water. A commercial laying mash may be purchased or a mash may be mixed according to the following formula:

	Percent		Percent
Ground yellow corn-----	25.0	Meat meal-----	4.0
Ground oats or wheat-----	10.0	Dried whey-----	4.0
Ground corn, wheat, barley, or grain sorghum-----	9.0	Steamed bonemeal-----	5.0
Alfalfa leaf meal-----	5.0	Ground limestone or oystershell--	2.5
Soybean meal-----	24.0	Manganized salt ¹ -----	1.0
Peanut meal, corn gluten meal, or soybean meal-----	10.0	Vitamin A and D feeding oil ² -----	.5

¹ and ². See footnotes 1 and 2 on page 14.

Any one of the whole grain mixtures given for growing chickens may be used for laying hens. The mash and grain may be fed in separate hoppers, permitting free choice, but quite often this results in consumption of too



67737-B

FIGURE 9.—White Wyandotte pullets eating dry mash out of hoppers.

much grain. The consumption of grain and of mash should be about equal, and in order to bring this about it may be necessary to limit the feeding of grain. When this is done grain is fed twice a day, a light feeding being given in the morning and a heavier feeding in the evening. The grain may be placed in separate hoppers or in the mash hoppers (fig. 9). Provide 15 feet of hopper (30 feet of feeding space) for each 100 layers.

Crushed oystershell or limestone should be available to the birds in separate hoppers at all times to permit the formation of good eggshells. In addition, it is desirable to supply some insoluble grit, such as gravel or commercial granite grit, which helps the gizzard to perform its function of grinding.

Fresh water should be supplied every day, and water fountains should be kept clean and sanitary. About 6 gallons of water are required per 100 laying hens per day.

The feeding of moist mash stimulates feed consumption and is a desirable practice when feed consumption decreases due to excessively cold weather or to disease. Moist mash is prepared by adding water or liquid skim milk or buttermilk to the regular mash. Milk products are especially valuable for this purpose because of their palatability and high nutritive value. The quantity of moist mash mixed at any one time should be such that the birds will eat it all in about an hour.

From the standpoint of egg production and health of the layers, pasture is as desirable as it is in the case of growing birds. However, eggs with light-colored yolks are preferred in many markets, and when that is the case hens should not be allowed on pasture. Hens on pasture produce egg yolks that are deep yellow or orange in color.

For producing hatching eggs, the same feeding system is recommended as for the production of market eggs, except that a commercial breeder mash should be fed instead of the commercial or home-mixed laying mash. The production of eggs of high hatchability requires more of several nutrients than the production of market eggs.

Feed consumption of laying hens varies with body weight and egg production. A 5-pound hen laying 150 eggs per year will eat about 87 pounds of feed per year.

FEEDING MARKET POULTRY

The finishing of chickens for market is done most economically on a large scale at specially equipped feeding stations. Many farmers are not able to fatten or finish their poultry to advantage, because prices received do not pay for the costs of fattening. However, when farmers market poultry direct to consumers they may be able to obtain prices to justify finishing the birds.

Best results are obtained by feeding a wet mash. Water or liquid skim milk, buttermilk, or whey is added to the dry mash in quantities just sufficient to make a mash that will pour readily. The following finishing mash formula is suggested:

	Percent		Percent
Ground corn.....	45.0	Soybean meal.....	10.0
Finely ground oats, wheat, or barley.....	34.0	Dried milk byproduct.....	6.0
Meat meal.....	3.0	Ground limestone.....	1.5
		Salt.....	.5

If liquid skim milk, buttermilk, or whey is used to moisten this mash, the dried milk byproduct may be omitted.

Birds that are being finished for market should be confined in batteries or small pens and fed three times a day. They should be given at each feeding as much as they will eat in half an hour. Broilers may be fed a finishing diet for 1 to 2 weeks, but the finishing period for older birds is usually not longer than 1 week.

Broilers that weigh $1\frac{1}{2}$ to 2 pounds at the beginning of the finishing process require $3\frac{1}{4}$ to $4\frac{1}{4}$ pounds of feed for each pound of gain if they are of the heavy breeds. If they are Leghorns they may require $4\frac{1}{2}$ to $5\frac{1}{2}$ pounds of feed per pound of gain. Roasters that weigh 4 to 5 pounds require $4\frac{1}{2}$ to 7 pounds of feed per pound of gain and capons and fowls require 8 to 12 pounds of feed per pound of gain during the finishing or fattening period.

STORAGE AND HANDLING OF FEEDS

Mashes, whether commercial or home mixed, should not be stored on the farm longer than 1 month and preferably not longer than 2 weeks. The nutrients are better preserved in the individual ingredients before mixing than they are in the mixed mash. They are better preserved in whole grain than in ground grain, so it is best to grind grain just before using it in a mash.

In the preparation of home-mixed mashes care must be taken that the ingredients are mixed thoroughly. It is best to weigh out first the ingredients used in greatest quantity and then to add the smaller quantities of other ingredients. The vitamin A and D oil should be mixed with a small quantity of ground grain before being added to the mash.

DIETARY DEFICIENCIES

Dietary deficiencies should not occur if proper attention is given to the information on the preceding pages. However, chickens in commercial flocks sometimes do develop staggering gait due to vitamin A deficiency, rickets due to vitamin D deficiency, "curled-toe" paralysis due to riboflavin deficiency, or slipped tendon due to manganese deficiency. Egg production is sometimes limited by deficiencies of vitamins A and D and calcium, and hatchability by deficiencies of vitamin D, riboflavin, and manganese. When nutritional disease or any other kind of disease is suspected, some affected birds should be examined by a specialist in poultry diseases. Examination of the birds is much more effective than examination of the feed.

Feather picking and cannibalism are related to diet and also to management. They are likely to occur in birds that are overcrowded and fed diets low in fiber or in salt. Very often feather picking and cannibalism can be stopped by adding 2 percent of salt to an all-mash diet or 4 percent to a mash that is being fed with grain, or simply by sprinkling salt over the mash in the hoppers. This treatment should not be continued longer than 2 or 3 days; continuous feeding of a diet high in salt is injurious.

Egg eating may be the result of overcrowding, an insufficient number of nests, or deficiency of calcium or vitamin D. It is not readily corrected by changing the diet. If only a few hens in a flock have acquired this habit, as is often the case, it is probably best to dispose of the offenders.

CAPONIZING

In certain sections of the country, especially in the vicinity of the larger markets where there is a demand for capons, farmers may find it profitable to caponize some cockerels each year. Caponizing is usually performed when the cockerels weigh from 1½ to 2 pounds. In this operation the testicles of the bird are removed, making it more docile and giving it a tendency to put on flesh more readily than cockerels. At the same time, in order to have the capons reach the largest weight attainable, they must be kept much longer than cockerels, since capons do not grow much faster than cockerels up to the time the cockerels reach maturity. Therefore the production of capons is to be encouraged only where special market prices justify keeping the capons longer than cockerels.

Further information concerning capons may be had from Farmers' Bulletin 849, Capons and Caponizing.

ARTIFICIAL LIGHTING

The use of artificial lights in the laying houses during the winter has become a common practice on many poultry farms. The lights do not increase the annual production of eggs so much as they increase the proportion of eggs during the fall and winter months, when egg prices are highest. In most parts of the United States lights are used from mid-September or the first of October to the latter part of March, to provide a 12- or 13-hour day.

Light increases the working day and tends to keep the birds in better physical condition and thus increases winter egg production (fig. 10).

Further information on artificial lighting may be obtained from the State colleges of agriculture or from the United States Department of Agriculture.

CULLING THE LAYING FLOCK

Laying flocks should be culled thoroughly at least once during the summer or early fall. The object of culling at that time of the year is to remove the poorest layers and to select the best for breeding purposes the next year. The method of banding birds with cheap celluloid bands, as outlined in a preceding section, can be taken advantage of at this time.

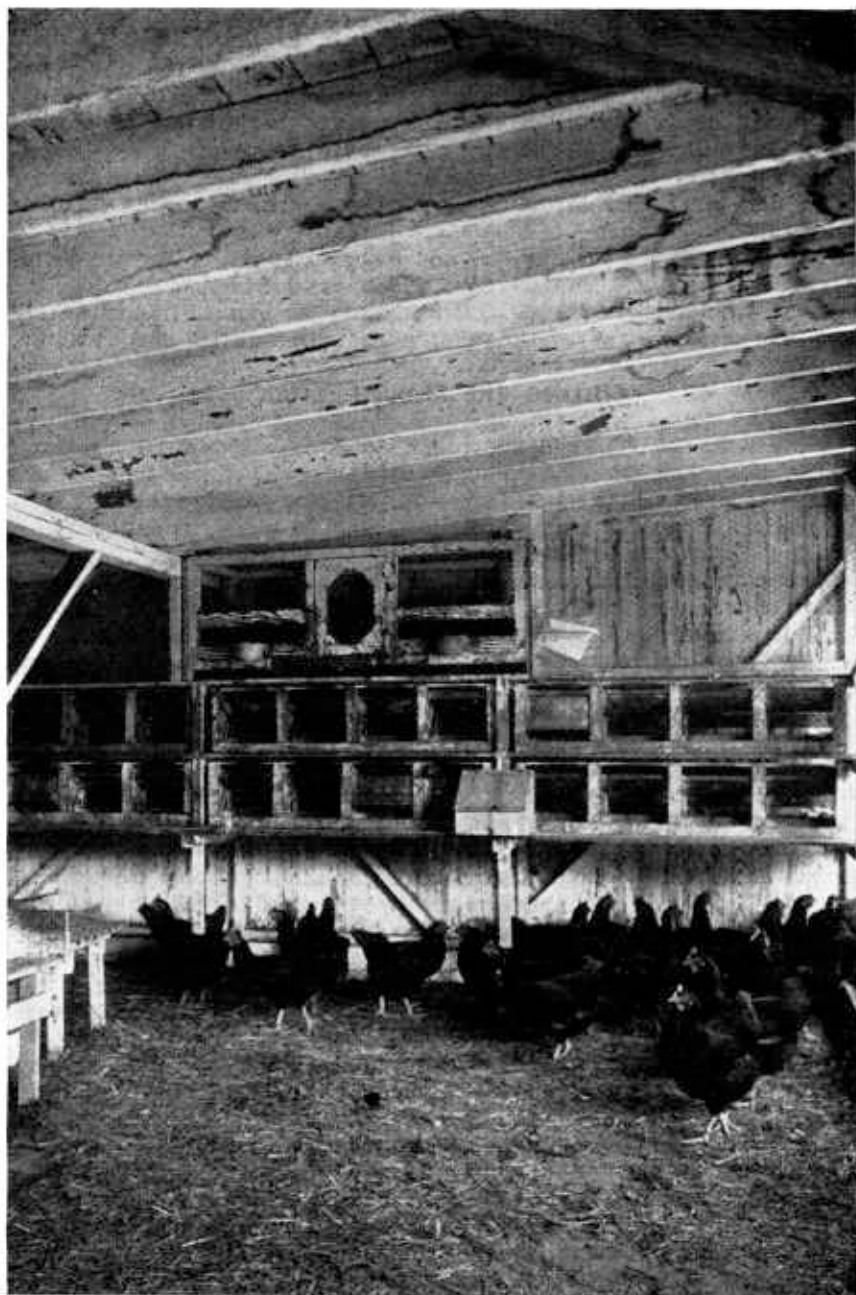
The banding of birds according to their previous production, as well as the number of times they have gone broody, will assist in picking out the poorest layers very readily and, at the same time, in selecting the best layers. In addition, there are other things that should be taken into consideration when the laying flock is culled.

Culling should be done thoroughly in order that no undesirable specimens shall be left in the flock. Each bird should be examined individually (fig. 11) both in respect to physical condition and from the standpoint of the color and quality of the flesh. When the bird is in good laying condition the combs and wattles are naturally bright red. Good layers have combs that are large, bright red, and glossy, whereas poor layers have dull, shriveled, and scaly combs. In normally yellow-shanked birds, the shanks of poor layers or of layers that are taking a long rest are usually yellow and the beaks tinted with yellow, whereas the beak and shanks of heavy layers are usually white. The pubic bones of a good layer are usually thin and flexible and when the hen is in laying condition they are wide apart. In the poor layer, they are frequently thick and rigid, and when the hen is not in laying condition they are relatively close together.

The handling quality of layers is also an important point in culling, and that of the skin serves as a good indication of laying ability. In a good layer the abdomen is enlarged, the skin over the body is soft and pliable, and the vent is moist. In a poor layer the abdomen is contracted and hard and the skin feels coarse and thick.

One other important factor to keep in mind in culling is the time of the molt. Poor layers molt earlier and much slower than good ones. Poor-laying hens may begin molting as early as July, whereas heavy layers generally do not commence to molt before September or October.

Culling is an economic feature in the proper management of the farm flock (figs. 12 and 13), because if done early enough it will save considerable cost in feeding the birds and at the same time spread the marketing of the



33561-B

FIGURE 10.—Rhode Island Red pullets in a well-lighted and well-ventilated laying house.



77512-B

FIGURE 11.—Each hen is handled in culling the poor layers out of this flock of White Leghorns.

HOW TO DETERMINE A POOR LAYER

MOLT	Early (July and August)
COMB	Shrunk, dull, and whitish scales
EYE	Sunken, dull, and listless
BEAK	{ Deep yellow (on yellow-shanked breeds)
SHANK	
PELVIC BONES . . .	Thick, rigid, close together
ABDOMEN	{ Rather hard and shallow from pelvic bones to end of keel
VENT	
	Small, puckered, dry

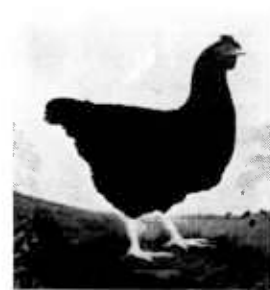


79133-B

A POOR PRODUCER . . . molting and not laying in August

FIGURE 12.—Chart showing points of a poor layer.

HOW TO SELECT A GOOD LAYER



79134-B

MOLT	Late (September and October)
COMB	Full, bright red, glossy
EYE	Bright, prominent, alert
BEAK	{ Pale or white (on yellow-shanked breeds)
SHANK	
PELVIC BONES . . .	Thin, flexible, wide apart
ABDOMEN	{ Flexible and deep as measured from end of keel to pelvic bones
VENT	
	Large, expanded, moist

A GOOD PRODUCER . . . laying, not molting, in late September

FIGURE 13.—Chart showing points of a good layer. (Compare with fig. 12.)

surplus hens over a longer period than if the culled hens were all marketed late in the fall. Another distinct advantage of culling is the material improvement in the breeding quality of the flock.

BREAKING UP BROODY HENS

To maintain high egg production during the spring and summer months, break up broody hens as quickly as possible after they become broody. This is vitally important for two reasons: In the first place, if they are allowed to sit on fertile eggs for even a few hours, the germs will develop, which is one cause of heavy loss in marketing eggs from farms. In the second place, the longer a broody hen is allowed to sit on the nest the longer it requires to get her back into laying condition and, consequently, the greater the loss in egg production.

As soon as a hen is observed to remain on the nest at night, she should be removed and placed in a broody coop where she can be properly fed and

watered. The broody coop should have a slat bottom to keep the hen from sitting. While confined in the coop she should be fed and watered regularly, in order to get her back into laying condition as quickly as possible.

Further information on this subject is given in *Farmers' Bulletin 1727*, United States Department of Agriculture, *Selecting Hens for Egg Production*.

HOUSING THE LAYING FLOCK

There are general principles which apply in all cases of poultry-house construction, but local conditions determine to a large extent the exact type which will give good results.

The first consideration in housing is comfort for the birds; unless they have comfortable quarters they cannot be expected to lay well. A comfortable house provides plenty of room for the birds, is well supplied with fresh air and, at the same time, is always dry. The number and size of the openings will depend on the section of the country. The condition of dryness in a house depends on the circulation of fresh air. Although a supply of fresh air at all times is essential, it is very important to allow no drafts to blow through the house.

One of the indications of an improperly ventilated poultry house is the condensation of moisture on the walls and ceilings; moisture is given off by fowls in breathing. If the foul, moisture-laden air, which contains carbon dioxide and other injurious gases, is not carried off regularly, the atmosphere of the house becomes excessively damp, and during cold weather the dampness collects on the walls and ceilings in the form of frost.

The position of windows is a very important matter, as they are used not only to provide light but also fresh air. The openings in the front are usually covered with glass or glass substitute and cloth curtains so that the amount of open space may be regulated to changes in weather. Too much glass space tends to make the house too warm in the daytime and too cold at night. During the warmer seasons of the year the windows and curtains should be open as much as possible.

The second essential feature in housing is convenience. The house should be of such size and shape that any work required can be done with greatest ease. The fixtures should provide for every convenience; windows and cloth curtains should be easily adjustable, hoppers should be of sufficient size to hold a quantity of grain, and nests should be easily accessible.

The third essential feature in housing is economy. A new poultry house need not be expensive but it should be durable; the more durable the house the less the per annum cost of construction per bird.

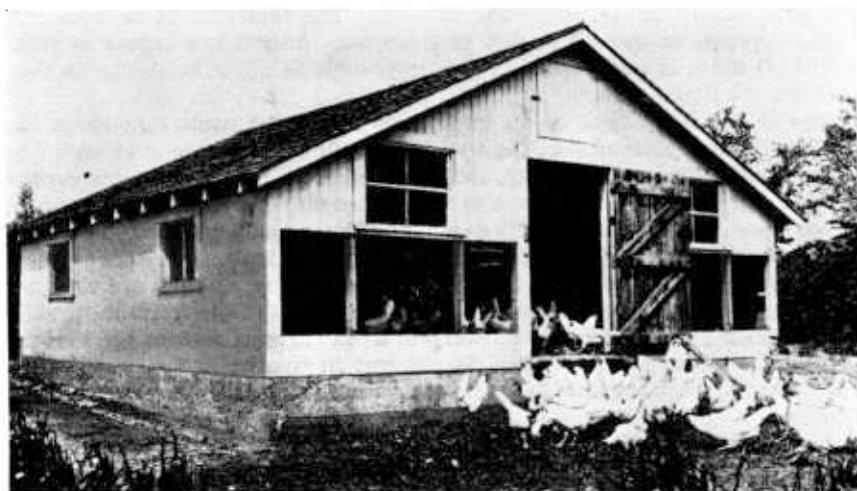
The location of the poultry house is important. It should be so situated that it will give best results, and it should also be convenient for the attendant. It is desirable to have the house in the shelter of large buildings or trees, which serve as protection against winds. The soil on which the house is built should be naturally dry and well drained. The house should face south or, in some sections, southeast or east.

Of the various materials used in the construction of poultry houses, wood is of chief importance. The wood should be well seasoned because green lumber is liable to warp, leaving cracks and gaps in the house and causing drafts. Poultry houses are generally constructed of yellow pine. Concrete, which is durable and sanitary, should be used for the construction of the

foundation and floor. For roofing material, shingles or prepared roofing is used.

The size of a poultry house is determined by the number of birds to be housed. Small flocks require more floor space per bird than large flocks. A safe working rule is to allow from 3 to 4 square feet of floor space per bird, depending on the size of the breed and the size of the flock.

The nearer square a house is—other things being equal—the less lumber is required. A long, narrow house is colder than a short, wide one, because it has a larger area of exposed surface and is more inclined to be drafty. The depth of a poultry house should be in proportion to its size and height, but no greater than will allow sunlight to reach nearly all parts of the building. Portable houses must be of such depth as to be movable, but the minimum depth for a stationary structure of good size should be about 15 feet. The length of a poultry house should be in keeping with the depth. If it is



28837-B

FIGURE 14.—The "Missouri poultry house" has been found to be satisfactory for many sections of the country. The gable is filled with straw, which tends to keep the house dry during cold weather.

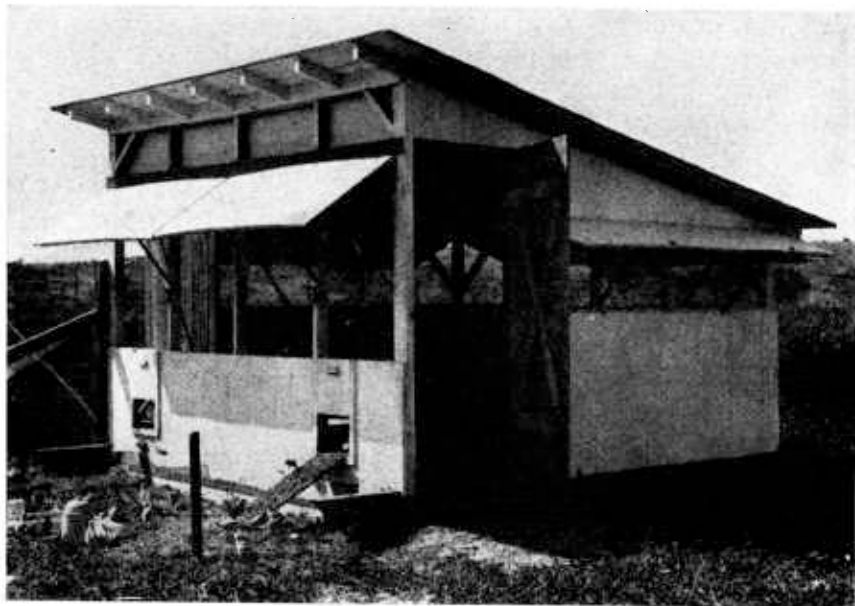
desired to build a long house to accommodate a large flock, then short solid partitions every 20 feet on the roosts help to make the birds more comfortable. Solid partitions should be placed at least every 40 feet or the house will be drafty.

The shape of the roof partly determines the cost of construction. The steeper the pitch the greater the cost of building, particularly a shed-roof house as compared with a gable, or combination-roof house. On the other hand, the steeper the pitch the longer the roof will last. Most roofs are made about one-sixth pitch, but wooden shingle roofs should be one-fourth pitch. With a gable roof, a false ceiling can be put in the house, which is an advantage in many sections of the country, as straw can be packed in the gable to help keep the house dry (fig. 14).

Each house for the laying stock should have two large yards attached to it, so arranged that the fowls can be kept first in one for a considerable time, then

in the other. Small, bare yards are objectionable because the birds do not get enough range or green feed and the soil soon becomes contaminated. Each yard should be plowed and cultivated occasionally and reseeded to a green crop. In this way the yards over which the laying stock ranges will always be kept clean. Soil contamination will be prevented and the possibility of having the flocks infested with worms and infected with various diseases is reduced considerably.

Further information on this subject appears in Farmers' Bulletin 1554, *Poultry Houses and Fixtures*. Plans of poultry houses suitable for local conditions may be obtained from the State agricultural colleges (fig. 15).



12783-C

FIGURE 15.—A house suitable for use in the South, as it provides plenty of ventilation during the summer. Comfort for the laying stock during the summer is as necessary as in winter.

PREPARING EGGS FOR MARKET

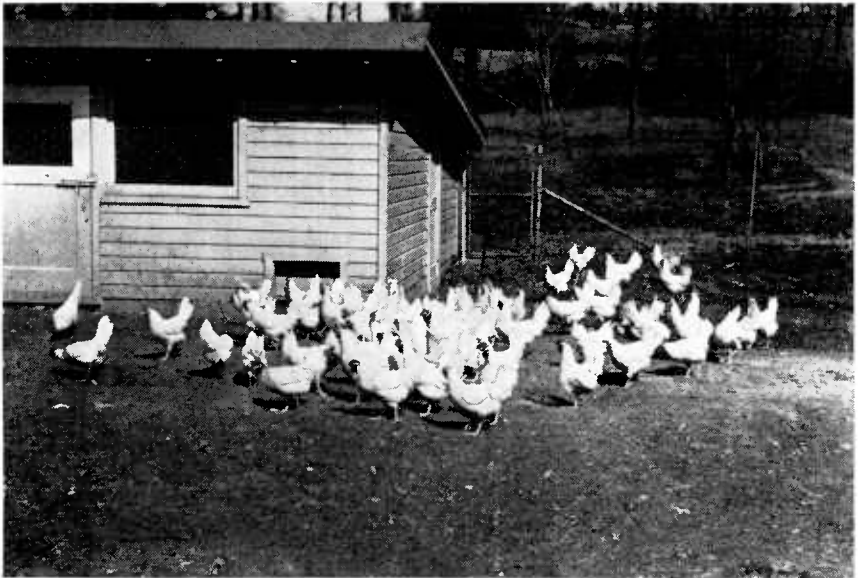
The conditions under which eggs are produced on many farms can and should be greatly improved. Such improvement would result in higher average prices to producers, a higher-grade product for consumers, and the elimination, to a great extent, of the present enormous annual waste of the egg crop. Dirty poultry houses and dirty nests are the cause of dirty eggs. Meat spots, blood spots, and bloody eggs cannot always be avoided, but they should not be sold with the rest of the eggs. Blood rings and rotten eggs are caused mostly by having the males with the females during warm weather and by broody hens sitting on the eggs. Musty and moldy eggs result from the storing of eggs in bad places. Hair splits, checks, and leakers are caused by rough handling.

Most of the conditions that give rise to bad eggs can be improved. If proper improvements are made (fig. 16), more good eggs will be sold and much money saved, for every spoiled egg means loss.

The following simple rules are suggested and if they are followed much of the trouble with which the egg trade has had to contend will be avoided.

- (1) Keep the hens in comfortable, sanitary houses and provide clean nests.
- (2) Gather eggs regularly and in warm weather, at least twice daily.
- (3) Store eggs in a cool moist room or basement.

(4) Produce infertile eggs for market. Remove all male birds from the breeding flock after the hatching season is over.



76353-B

FIGURE 16.—Clean, infertile eggs are obtained from a selected flock of hens, kept under good conditions, from which the roosters have been marketed or separated.

PREPARING POULTRY FOR MARKET

When the birds are ready to be killed, they should be fasted for 12 hours, but have plenty of water, which will flush out feed from the crops and intestines. Starving before killing is an important practice.

One of the best ways to kill a fowl is to bleed it by severing the arteries in the neck. From the ceiling of the room in which the killing is to be done the fowl is suspended by the feet at about the height of the shoulder of the plucker. Any stout cord with a short stick attached to the end will do to wrap around the bird's feet. In that position it is ready to be bled.

The head of the fowl is taken in the left hand and a sharp, narrow-bladed knife, ground to a sharp point is taken in the right hand. With the thumb and forefinger of the left hand the mouth is forced open by pressure and the knife is inserted into the mouth with the blade pointing toward the back of the head. The knife is then forced up to the juncture of the head and neck where the arteries come down on each side of the neck; these are severed

and the fowl bleeds freely. For a left-handed person the operation would be performed in the opposite way.

Immediately afterwards the point of the knife is plunged through the roof of the mouth and into the brain. When this is done properly the bird will squawk and make convulsive movements which tend to loosen the feathers in the feather muscles. If the brain has not been properly pierced the feathers are hard to pluck and the skin is frequently torn badly.

As soon as the bird has been bled and the brain pierced, a blood can, weighted in the bottom, is hooked through the lower mandible (beak) to catch the blood. It also keeps the bird from moving the body too much.

In dry picking the feathers should be plucked immediately after the bird is killed. (Figs. 17 and 18.) The order of picking is as follows: Large wing and tail feathers, breast, sides, thighs, legs, back, neck, and lastly the small



5748-B

FIGURE 17.—The first operations in dry plucking.



5753-B

FIGURE 18.—The final operations in dry plucking.

feathers of the wings. Feathers should be pulled or rubbed off in the direction of the slant of the feathers. After the bird has been rough plucked any small body feathers should be removed and the pin-feathers pulled out with a dull knife.

Dry picking or semiscald picking is necessary for birds sold on some markets and for those going into cold storage. Some markets pay a premium for such birds while no difference in price is made in other markets.

Semiscald picking, which produces a bird having the appearance of dry picking, is commonly used in poultry packing plants and may be adapted for small producers. After the wing and tail feathers are removed the bird is agitated for about 25 to 35 seconds in water held at a uniform temperature of 125° to 128° F.

Scald picking is much simpler than dry plucking and is satisfactory where the dressed birds are used at home, sold locally, or are not to be stored. Care

should be taken not to have the water too hot (not more than about 180° F.), or the skin will be hardened or partially scalded. After the bird has bled thoroughly it is held by the head and feet and soused in the hot water just long enough that the feathers will pull easily. The pinfeathers on the body and legs can then be rubbed off.

As soon as the birds are plucked they should be cooled as rapidly as possible. If the crop contains much feed it should be removed but the birds should be starved before killing so that the crop will be empty. The birds should be cooled quickly in a chilled room or in cold air. When such conditions are not available the birds should be cooled in cold or iced water until the body heat is entirely gone.

Detailed information on this subject is given in *Farmers' Bulletin 1377, Marketing Poultry*.

SANITATION

The stock should be healthy and vigorous and should be managed to prevent disease infection. Sanitation, nutrition, and surroundings all affect the health of the stock.

Farm flocks are frequently badly infested with lice. This is unnecessary, because there is a very simple method of treating birds with sodium fluoride that will completely destroy all lice and their eggs on the fowls. The carbolineums are advised for the control of the common chicken mite and the fowl tick. Lice stay on the poultry while mites will be found around the dropping boards and in the nests. Methods for destroying lice and mites will be found in *Farmers' Bulletin 1652, Diseases and Parasites of Poultry*.

In the matter of housing it has been pointed out that the house must be roomy, clean, dry, well lighted, and properly ventilated. The use of deep litter on the floor of the poultry house save labor and makes the building more comfortable. Lime added to deep litter helps to keep the litter dry and more sanitary. Every poultry house and coop should be cleaned thoroughly at least once every year. To clean the poultry house, remove all dirt and scrape the floor thoroughly. Then wash the floor, roosting quarters, nesting quarters, and lower parts of the building using a solution made by dissolving 13 ounces of commercial lye in 13 gallons of water (fig. 19).

DISINFECTANTS

The following brief information concerning disinfectants and their application is adapted from *Farmers' Bulletin 1652, Diseases and Parasites of Poultry*.

Good disinfectants destroy the germs of contagious diseases and some of the external parasites, such as mites, ticks, and in some cases eggs of parasitic worms. The disinfectants should be thoroughly applied to the interior of the houses, worked into all the cracks and crevices, spread over the ceiling and the floor, roosts, dropping boards, nest boxes, feeding and drinking troughs. Disinfectants are most easily applied to the walls and ceilings with a spray pump or with a brush. As it is difficult to keep them from coming into contact with the face and hands, the more harmless ones should be used. Ordinary whitewash made from freshly slaked lime is excellent and its properties are well known. Where there has been disease, use a whitewash made by dissolving 1 pound of commercial lye and 2½ pounds of water-slaked lime in 5½ gallons of water.



11500-A

FIGURE 19.—Thorough cleaning and spraying of the poultry house helps to keep the flock healthy and free from disease.

The compound solution of cresol is one of the best disinfectants and may be purchased ready for use. A 3-percent solution of cresol compound will give good results. A 5-percent solution of carbolic acid (1 pint of carbolic acid to 10 quarts of water) may be used. The choice between the two is a matter of convenience.

PREDATORY PESTS

Aside from the losses sustained through the ravages of various diseases as well as decreased egg production brought about by infestation of the birds with lice and mites, there are other enemies of the farm flock against which every possible precaution should be taken. Many farmers do not realize, for instance, that a few rats will not only gnaw holes in the woodwork of a poultry building, but will kill young chickens and also consume considerable quantities of grain, the damage becoming greater if the rats are allowed to increase. Every precaution should be taken, therefore, to keep rats in check as much as possible. This can be done by having concrete floors and foundations in the poultry houses and by occasionally cleaning out the house thoroughly to make sure that no rats are nesting on the inside.

It is not easy to give definite advice with respect to the protection of chickens from hawks, crows, foxes, etc., because of the difficulty of keeping such birds and animals entirely away from the flocks. One helpful method is to have a shotgun handy and use it as occasion requires.

